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ABSTRACT

This paper presents a plan for the next generation of speech laboratories which integrates technologies of modern communication in order to improve and modernize the instructional process. The paper first examines the application of intermediate technologies including audio-video recording and playback, computer assisted instruction and testing programs, speech analysis and criticism programs, and advanced bibliographical systems. The rest of the paper consists of an in-depth consideration of the applications of hypertext (systems of non-sequential reading and writing allowing users, by combining natural language text with the computer's capacity for interactive branching, to link information together, creating trails through associated materials). Twenty-one references conclude the paper. (SR)

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A PERSPECTUS FOR THE FUTURE DEVELOPMENT OF THE SPEECH LAB: HYPERTEXT APPLICATIONS

by

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Public speaking for most of us is a core or required course for undergraduate students across our campuses. Each semester, we teach scores of students in introductory communication theory using the classroom as a laboratory in which students deliver a variety of speeches which are evaluated and graded. However, the approaches we employ are most often drawn from instructional models which fail to incorporate the technologies of twenty-first century society.

The speech laboratory at the University of Vermont has been a modest attempt to integrate some technologies of modern communication in an effort to improve the instructional process. The following paper constitutes a far reaching plan for the next generation of speech laboratories. Structurally, the following briefly examines the application of intermediate technologies including audio-video recording and playback, computer assisted instruction and testing programs, speech analysis and criticism programs, and advanced bibliographical systems, and then, depthfully considers the applications of hypertext.

First, an apology: the first brief section will make peripheral references to hypertext. Please accept my regrets regarding this organization discrepency, and accept my assurances that hypertext will be explained in great detail later in this paper with appropriate cross referencing to the earlier part of the paper.

AUDIO-VIDEO RECORDING AND PLAYBACK

The current application of audio-video recording and playback at UVM involves the recording of speeches given by students and the evaluation of such with the assistance of lab monitors. The recording takes place with standard portable cameras with attached microphones fixed on stands in the back of the classroom. The student provides her instructor with a tape on which her speech is recorded. She must then watch and evaluate her performance which she records on a supplied evaluation sheet.

While this approach has been positively received, it has some substantial drawbacks. First, the recording is obtrusive. The appearance of a video camera in the back of the classroom seems mostly to enhance speech anxiety. Second, the microphone, being attached to the camera, often produces a tape with insufficient volume or dominated by noise from the hallways or from the traffic outside the building.

The next generation of audio-video support must involve cloaking the camera and using a more sophisticated directional microphone. This step should consider the use of multiple camera angles: full front, profile, and back recording. The full front and profile angles will provide the students with a clear record of her speech with a better record of her non-verbals. The recording can be played back on a split screen so both angles can be viewed simultaneously. The back recording will provide the student with a record of audience feedback and can be a useful adjunct in the speech self-analysis.

Finally, this system could be supplemented with an active and updated speech library whereby model speeches can be retained for in-classroom and in-lab monitoring, acting as instructional support.

COMPUTER ASSISTED INSTRUCTION AND TESTING PROGRAMS

The Brownstone Research Group has already introduced a set of simple computer supported testing programs. The system for Ehninger et al, PRINCIPLES OF SPEECH COMMUNICATION, tenth edition, is called DIPLOMA. The PROCTOR program allows the instructor to create tests from a supplied text bank, EXAM, and/or supply some questions of her own.

All Brownstone has done is to record questions found in the instructor's guide on disk and supply software which allows the instructors to maintain grading calendars and individualized tests. Though this service is not without merit, it hardly approaches the level of computer assisted instruction/support technologies available.

Though the Brownstone package is helpful, the next generation of computer assisted instruction/support must involve the appliciation of learning/instruction programs with text banks in order to allow students to progress independently and, literally, test out of material they comprehend to move on to more challenging material. This new generation of software will be greatly assisted with the application of hypertext.

SPEECH ANALYSIS AND CRITICISM ADJUNCTS

. At UVM, a full-time speech faculty member will teach anywhere from seventy to one hundred students per semester. Each students gives no less than three speeches. In total, this means a speech instructor at UVM listens to anywhere from 210 to 300 speeches a semester. After each speech, the instructor is expected to announce and write out criticisms of each speech. This had become a near insurmountable task especially since we wished to offer a comprehensive written critique. This was true until the design of a series of files containing comments appropriate to each different type of speech (informative, value argument, and policy argument).

The speech analysis program is immensely simple and requires absolutely no programming knowledge to use. The system is best explained through example. A student has delivered an informative speech. The instructor has a form which allows her to check off or circle symbols relating to common errors made by the speaker. After the speech is over, the instructor sits before her micro, and loads the program calling up files relating to the list of common errors she observed for each student. These files are linked together froming a coherent train of criticism. In addition, each comment is cross-referenced to pages in the text and outside readings. Students are then expected to return to these references in order to understand in greater detail the problems they had encountered and the rationales for the grade they received.

Though this system is still in its testing phase. It has received glowing reviews from both instructors and students. Currently, it has only been designed for a course using the Ehninger text, tenth edition, as supplemented by value argument readings which we keep on reserve.

The next generation of speech criticism software should be joined into hypertext/media to allow the student to take advantage of browsing and navigational links to readings and materials which help clarify instructor criticisms.

ADVANCED BIBLIOGRAPHICAL SYSTEMS

Vannevar Bush, science advier to FDR, once commmented that "instruments are at hand which, if properly developed, will give a man access to and command over the inherited knowledge of the ages" (1945:101). However, we are mostly using nineteenth century data filing within out universities.

With some notable exceptions, the library still is a building in which information is stored. Accessing this information is akin to having to deal with a desk clerk in order to make love. Although recent software introductions have occurred, they mostly involve storing the card catalog on tape. Intermediate technology like the laserdisk is marketed with hard versions of magazine and journal indexes.

The newest format for computer supported bibliographical services is called remote access. An example of remote access networking can be found on the campus of the Georgia Institute of Technology. Forseeing a need to make the library "more easy to use on campus, in the dorm, or at home" (Drake 1987:47), Georgia Tech became one of the first universities in the United States to provide remote electronic access to a catalog of "more than 350,000 books and documents, in addition to access to the indexes of four extensive periodical databases (Corporate and Industry Research Reports, Magazine Index, Management Contents, and Trade and Industry

Index)" (Drake 1987:45).

This project, coined Library 2000, provides "electronic searching of the catalog which offers one of the largest scientific and technical collections in the nation. Library 2000 includes indexes to more than 1,100 magazines and journals, with four year issue coverage. It also provides timely profiles on corporate research projects underway throughout the world" (Drake 1987:46).

However, these advanced bibliographical systems are intermediate technology only. They only make it easier to compose bibliographies. Though this is useful, it falls pathetically short of taking advantage of our computer design capabilities.

Maybe Machiavelli was right. "There is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order." The time is closely approaching when our libraries must bifurcate into archives for rare materials which often are not in written form, and offices for librarians who will function as instructors in hypertext/hypermedia management. The university library of the future will be mostly void of pressed paper and will near entirely release information from its Gutenberg fetish storing the written word in mainframes.

INFORMATION TECHNOLOGY

When the micro first appeared on the scene, it was hailed as "the most profound change in civilization since the invention of agriculture. A revolution on the same level as the Copernican revolution" (Ofiesh 1986:300). However, the micro has been near entirely underused.

The micro can become the most civilizing influence to date. It can "amplify our intelligence and our ability to manipulate symbols" (Ofiesh 1986:316). When Pamela McCorduck on a personal search for a bridge between C. P. Snow's Two Cultures -- the arts and the sciences -- sees the

computer as the bridge, the machine of the century (1985:9-16). However, education has not been able to draw the same conclusion. Its failure to release its myopic grasps on tradition has led to a strange and uninteresting application of computers.

Education technology has become a queer science. Too often, it is based on the adaptation of present technological developments to educational purposes rather than on developing technological innovations from learning needs. With the inventions of micros and videodisks, educational technologists began to apply them to computer assisted instruction and bibliographical systems. However, this level of application reflects a very real failure by theorists and scientists to approach technology as a learning tool rather than as a teaching tool.

Instead of asking how can the student best learn, we have been asking how can we help the instructor teach. Not wanting to demean the role of the instructor in educating, it should become evident that focus in education, rightly or wrongly, has been set on the learning process and not the teaching process. As long as the subject demonstrates knowledge and understanding, the process of acquisition becomes less important. If this perspective is legitimate, then educational technology should be designed directly from learning goals with less emphasis on releasing instructors from some tasks in order to allow them to tackle others. Technology is no longer a prosthetic or an adjunct to the learning process, it is slowly becoming an intrinsic part of the process. As such, it needs to be reevaluated.

The greatest obstacle to learning has been the information glut. As Vannevar Bush commented in 1945:

> There is a growing mountain of research. But there is increased evidence that we are being bogged down today as specialization extends. The investigator is staggered by the finding and conclusions of thousands of other workers -- conclusions which she cannot find time to grasp, much less to

> remember, as they appear. Yet specialization becomes increasing necessary for progress, and the effort to bridge between disciplines is correspondingly superficial (101).

The entire summation of human experience is being expanded at a prodigious rate. However, the means we use for threading through the consequent labyrinth to the momentarily important item is "the same as we used in the days of square-rigged ships" (Bush 1945:102). It is becoming more and more diffcult to separate the wheat from the chaff. What we often need to know is buried deeply within the insignificant and unimportant. Paradoxically, "in a time of technological turbulence, survival may hinge on our ability to evaluate complex facts swiftly and accurately" (MIT Nanotechnology Study Group 1987:n.p.). However, specialization and credentialism continues to drive humans deeper down darkening tunnels of professional mastery, and the important crosslinkages between these tunnels are not being excavated. This is especially dangerous when we understand that "we change our minds about what the world is like and where it is going, when we change our internal networks of knowledge. Reasoned change often requires that we compare competing patterns of ideas" (Drexler 1986,225).

Sometimes, information may simply become buried. Ofiesh and others tell the story of Gregor Mendel's understanding of the laws of genetics which was lost to the world for a generation because his publication did not reach the few who were capable of grasping and expanding it. In the twenty-first century, this problem may become staggering. Information overload has become a well-known problem as part of our society's "future shock." Thousands of technical journals cover thousands of subjects. Published articles mount by over a million per year. As a result, our "formal institutions can tap only a tiny fraction of the mental energies of our society"

(Drexler 1986217). The problem is that "professionaly our methods of transmitting and reviewing the results of research are generations old and by now are totally inadequate for their purpose" (Bush 1945:101).

HYPERTEXT

The solution to these problems may lie with "hypertext." Hypertext means "non-sequential reading and writing. A hypertext system allows users to link information together, thereby creating trails through associated materials. A link connects words or sentences in one electronic document to related information in another document" (Smith 1988:32). Ted Nelson, one of the pioneers of hypertext, once defined it as "a combination of natural language text with the computer's capacity for interactive branching, or dynamic display of a nonlinear text which cannot be printed conveniently on a conventional page" (Nelson 1967). Jeff Conklin from the Microelectronics and Computer Technology Corporation described it this way.

> From a computer science viewpoint, the essence of hypertext is precisely that it is a hybrid that cuts across traditional boundaries. Hypertext is a database method. providng a novel way of directly accessing data. This method is quite different from the traditional use of queries. At the same time, hypertext is a representation scheme, a kind of semantic network which mixes informal textual material with more formal and mechanized operations and processes. Finally, hypertext is an interface modality that features "control buttons" (link icons) which can be arbitrarily embedded within the content material by the user. There are not separate applications of hypertext: They are metaphores for a functionality that is an essential union of all three (1987:33).

Hypertext can be very curde. For example, one kind of manual hypertext is the traditional 4x6 index card for note taking. Note cards are referenced to each other, and are arranged hierarchically in a shoebox. Another kind of manual hypertext is the reference book, exemplified by the dictionary and the encyclopedia. As one reads an

article or definition, explicit references to related items indicate where to get more information about those items. Recently, the Academic American Encyclopedia, structured as a simple hypertext has been made available to "90,000 subscribers, including 200 libraries and eight schools" (Drexler 1986:229).

There are many documents in which references to other parts of the document, or to other documents, constitute a major portion of the work. "Both the Talmud, which its heavy use of annotations and nested commentary, and Aristotle's writings, with their reliance on references to other sources, are ancient prototypes of hypertextual representations" (Conklin 1987:20). For that matter, this convention paper with its footnotes and references constitutes a simple form of hypertext.

The concept of hypertext is quite simple: Windows on the screen are associated with objects in a database, and links are provided between these objects, both graphically (as labelled tokens) and in the database (as pointers). Every day, we deal with the hypertext-like systems of electronic mail and teleconferencing. However, the distinct difference is that in hypertext, links within and between documents are machine-supported. Consequently, the tricky set of rules and elaborate supervisory functions become unnecessary.

Hypertext may best be understood as nonlinear text. "Mechanisms are being devised which allow direct machine-supported references from one textual chunk to another; new interfaces provide the user with the ability to interact directly with these chunks and to establish new relationships between them" (Conklin 1987:17).

The "document" is the fundamental unit in hypertext, and literature becomes "an ongoing system of interconnecting documents" (Nelson 1984:2/7). Superdocuments are created when links are created. When documents become highly interconnected, we approach a "docuverse." The

evolving corpus is continually expandable without fundamental change. "New links and windows may continually add new access pathways to older material" (Nelson 1980:1013).

Hypertext has been generally envisioned in terms of "macro literary systems: the study of technologies to support large on-line libraries in which interdocument links are machine-supported (that is, all publishing reading, collaboration, and criticism takes place within the network)" (Conklin 1987:20). Presumably, within the macro library a database (a network of textual nodes) could be browsed in each of the following ways: "(1) by following links and opening windows successively to examine their contents, (2) by searching the network (or part of it) by some string, keyword, or attribute value, and (3) by navigating around the hyperdocument using a browser that displays the network graphically. The user can select whether the nodes and links display their labels of not" (Conklin 1987:19).

In 1945, Vennevar Bush, the father of hypertext, described a "memex," a tool that provides access to a large collection of microfilm and mechanisms to make links between any two pieces of information in the system (106-107). In 1963, this conceptual work became embodied in NLS (oNLine System) designed by Doug Engelbart (1963). Also during the sixties, Ted Nelson began work on Xanadu, "a computer system designed to use links to organize large bodies of online literature" (Smith 1988:34). Nelson coined the term "hypertext" (1980). In 1967, he went on to work with Andy van Dam at Brown University. Though some work was done in the seventies, in the eighties, there has been a frenzied interest in hypertext. Two of the Largest research project are NoteCards from Xerox PARC and Intermedia from Brown University.

The best known version of full hypertext is NoteCards developed at Xerox PARC (Halasz, 1987). Currently, "between 50 and 100 users use

NoteCards many of them outside of Xerox (even though it is not a supported product). Several of these users have constructed very large databases in the system (for example, 1600 nodes with 3500 links between them)" (Conklin 1987:28).

One of the largest hypertext research groups is at Brown University. The Intermedia project is building on two decade of work and three prior generations of hypertext systems (Yankelovich 1985). A current hypertext project is being developed "as a tool for professors to organize and present their lesson material via computer and as an interactive medium for students to study the materials and add their own annotations and reports" (Conklin 1987:29).

In Spring 1987, Intermedia was applied in two courses. "One professor taught an English Literature course where students followed links to see what influenced the writing styles of authors. The other professor linked his lecture notes to three-dimensional models of the cells they studied to diagrams of experiments so that students in his Plant Cell Biology course could better integrate the material" (Kinnell 1988:35).

According to George Landow, the English Literature professor, "more students too part in the discussions" and "they began to cite bibliographical and historical information." Landow attributes these improvements to "Intermedia's ability to effectively deliver background material to students" (Kinnell 1988:35). Peter Heywood, who taught the Plant Cell Biology course, found that "students followed links to material he had not yet covered" and "they had a better appreciation of the course material" (Kinnell 1988: 35 & 39).

There are also some commercial hypertext products, such as Apple's HyperCard and Owl International's Guide. However, they are better applied at a single micro station and are less effective in larger networks.

Hypertext is a piece of software which has been designed as user

friendly. This means that the approach to designing these interactive systems has incorporated "the design of virtualiy. By virtuality, designers mean the seeming of an object or system, its conceptual structure, its atmospherics and its feel" (Nelson 1980:1014). Nelson used the metaphor of movie-making when discussing "virtuality." He says, "What counts is effects, not techniques . . . The design of an interactive computer environment, similarly should not be based on particular hardware, or a particular display device, or a programming technique" (Nelson 1980:1014).

Design of virtuality must be wed with another key restraint in system design: "conceptual simplicity. If any but highly trained people are to use a system, it must be extremely simple. "It must be simpler by far than anything computer people are accustomed to designing -- a factor of ten, let us say, simpler than what a computer hacker considers simple" (Nelson 1980:1014). Nelson and others remind us that popular lore in computer science "that simple means not powerful" is counterproductive. True power is easy and focussed control by the user on what she means to do. This requires simplicity.

The working premise of hypertext was defined by Engelbart as "automated external symbol manipulation."

> The symbols with which the human represents the concepts she is manipulating can be arranged before her eyes, moved, stored, recalled, operated upon according to extremely complex rules -- all in very rapid response to a minimum amount of information supplied by the human, by means of special cooprative technological devices. In the limit of what we might now imagine, this could be a computer, with which humans could communicate rapidly and easily, coupled to a three-dimensional color display with which extremely sophisticated images could be constructed (1963).

It should be obvious that a necessary defining characteristic of hypertext is linkage. The link is simply a connection between parts of text. It is put in by a human. The main set of links are called the

"literary set." They are (1) "the jump-link, corresponding to a footnote; (2) the quote-link, corresponding to the printed quotation; and (3) the correlink, resembling the marginal note, or "corresponding part"; and (4) the equilink acts as a link between the same thing in two version of the same document" (Nelson 1980:1016 & 1019).

Randall Trigg wrote a dissertation on hypertext while at the University of Maryland within which he described two basic link types or primitives: support links and refutation links. A refutation link links one document to another in which a critic has recorded arguments denying some claim in the original document. A support link, on the other hand, includes all four from the "literary set." Twigg actually described over eighty link types claiming that "the disadvantage of having a limited set of link types is outweighed by the possibility of specialized processing on the hyperdocument afforded by a definite and fixed set of primitives" (1983).

Links are accessed from windows via link icons which represent pointers to other nodes in the database. A node is a document. The link icon contains a short textual field which suggests the contents of the node it points to. "In addition to the explicit linking performed by referential and organizations links, there is a kind of implict linking that occurs through the use of keywords. This type of linking is yet to be fully explored" (Conklin 1987:35).

The final technical issues associated with hypertext involves storage of textual material. With the advent of fractal algorithms, image compression has become practical. In additional, fractal algorithms speed the process of matching a request with what is in its memory (Scientific American 1988:28). The further advances in optical scanning allow reading text in addition to produce bar codes. Once type specific parameters have been programmed, scanners are able to read alphabetics. Finally, CD ROMs

"have brought us to the point where we can cost-effectively store, compress, and disseminate information" (Ofiesh 1986:302). Todays' Encyclopedia Britannica in forty volumes could not fill a compact disk.

EVALUATION AND APPLICATION OF HYPERTEXT

There are many advantages to the introduction of hypertext. First, hypertext revolutionizes reading. Reading is mostly troublesome because it fails to encourage "horizontal deviation." Once a term is read and not understood, the reader must either turn to a glossary, if one is provided, or else turn to a dictionary or encyclopedia for reference. Hypertext with its link system glossarizes literature. In addition, there is no longer a reason to buy a side of beef when all you want is a hamburger. Users need to be able to browse through forests of interconnected material in order to ferret out pertinent facts. The on-line hypertext system is identifiable down to the byte level, and would make literature reviews tremendously easy. Moreover, when we read, we make mental notes or if we are library terrorists, we scribble them into books. This is just another form of a link in hypertext. Finally, on a large network, hypertext would be the natural medium for a world electronic library.

Second, hypertext revolutionizes writing. This is done in two different ways. First, one of the most cumbersome parts of the writing process is research filing. Keeping tracks of files is an endlessly complex and exasperating chore. This is especially true since most all filing systems are hierarchical. Nelson finds hierarchical thinking counterproductive.

> Some people think hierarchically and that's fine, but those who don't should not be forced to do so. There are those who imagine that forcing a problem into a hierarchical structure promotes clear and rigorous thinking. But that is, to use the politest possible terms, malarkey; mapping any set of ideas to any other may present interesting exercises to the mind, but there is little point if the two sets do not match (Nelson 1986:83).

Furthermore, hierarchies are fixed and rigid and quite hard to change. Unfortunately, the way we think about our work is constantly changing at the highest level. Data have to be split into separate files even though they are related to each other. With hypertext, file conventions become irrelevant. Cross-referencing is done through links and can be supported non-hierarchically. Nelson calls it a world without files -- "a world where the user sees her latest work in its preferred appearance and format while still being able easily to trace interconnections and compare versions" (1986:84).

A second way in which hypertext revolutionizes writing is through on-line publishing. According to Lancaster, "it now is feasible to replace large-scale systems of in-house publishing with computer storage' (1978); and "it will soon be practical to do the same for publishing to the open public" (Nelson 1980:1013). Hypertext makes "true electronic publishing feasible -- that is, public-access document systems with digital storage and demand service to the open public" (Nelson 1980:1013). Problems associated with royalties have been adressed extensively in Nelson's Literary Machines in which he presents many different options for on-line publishing and the collection of royalties.

Third and finally, hypertext revolutionizes education. It is unfathomable why so little education is cumulative. There is no reason why curriculum (originally meaning "racetrack") is assumed to be of any importance, thought to be anything other than a pointless and painful charade. With hypertext, "there are no subjects. Everything is deeply intertwined. The true interconnectedness of knowledge that makes scholarship interesting is available" (Nelson 1982:178. Personal conflicts and cognitive style which makes teacher/student interaction difficult is alleviated with the freedom of hypertext. However, it is very important to note here that hypertext is different from traditional

computer assisted instruction in at least one basic way: in computer assisted instruction, "the author locks you into a specific situation and there you are -- constrained to do the task that has been set for you, however long it takes" (Nelson 1982:178). In hypertext, "we retain one of the great traditions of Western literature: freedom to turn the page or close the book. You are free to write marginalia of disagreement anywhere -- which everyone else is in turn free to ignore. The rigidity and narrow-mindedness of today's computer assisted instruction will open out into the freedom of hypertext exploration" (Nelson 1982:178).

Moreover, scholarship is affected when "we can have full and independent linking and windowing. A commentator or critic can underline precisely what she is referring to at any time, and gather together whatever pieces support her thesis. Intercomparison and exegesis become easier to do and easier to follow. Detailed annotations to existing writing may easily be published; anthologies of related materials can easily be put together" (Nelson 1982:178). In addition, "minority voices are more easily heard." Media coverage will not grant minority opinions an opportunity to be heard when the media's primary canon is to kowtow to the conservative masses. With hypertext, minority viewpoints should be more available for inspection since appending criticism is less filtered.

Hypertext offers substantial advantages to reading, writing, and learning. As a speech/rhetoric professional, hypertext can significantly enhance the educational process in at least four ways: speech composition and content criticism, revised computer assisted instruction, outline processing, and hypermedia appliations.

First, hypertext revolutionizes speech composition and content criticism. Compositionally, on-line drafts allow a colleague, teaching aid, and instructor the opportunity to insert comment at any point in the manuscript. "With hypertext, she would simply make a link from the draft

to a new comments document and enter suggested changes. Her colleague could then read these recommendations and edit the draft accordingly" (Smith 1988:33). Comments can be received from multiple sources with expertise in fields of content, composition and writing, and editorial and bibliographical services.

A current example of this application is found on the campus of the University of Southern California. Project Jefferson is a "joint research project involving the Industrial and Systems Engineering Department, the Freshman Writing Program, and the library" (Kinnell 1988:34). Its goals are ambitious: "integrating the assignments of the Freshman Writing Program classes, the pedagogical goals of the instructors, the teaching of library and research skills, and the ability to access online information with a minimum of training" (Kinnell 1988:34).

Hypertext revolutionizes computer assisted instruction. In rhetoric, we deal with issues, controversial and "wicked." "Wicked" is a term used by Horst Rittel and his students.

> "Wicked" problems lack a definitive formulation; their problem space cannot be mapped out without understanding the solution elements; in short, the only way to really understand a wicked problem is to solve it. Wicked problems have no stopping rule. Solutions to wicked problems are not "right" or "wrong"; they just have degrees of sufficiency (Rittel 1973).

By understanding competing views, a student is able to understand the whole problem better. Rittel has introduced the notion of Issue-Based Information Systems (IBIS) to address "wicked" problems.

> IBIS systems are thus a marriage of (1) teleconferencing systems which enable many people to participate in one conversation, and (2) hypertext, which allows participants to move easily between different issues and the different threads of argument on the same issue. The current version of Rittel's IBIS runs on an Apple PC (Conklin 1987:24).

As a tool for teaching issue analysis and argumentation, IBIS is extremely useful. However, its application needs to be further investigated to include many of the following: the interactive effects of

Aristotelian elements of good speaking; the similarities and differences between syllogistic reasoning and Toulmin's model of argument, the rigors of inductive and deductive reasoning, the analysis of value ladened reasons from Warnick, Perelman, Weaver and others. The list is endless. However, unlike traditional computer assited instruction which asks a student to respond to a fixed text bank of questions after having completing a learning program, IBIS encourages the the dialectic of good instruction.

Hypertext revolutionizes outline construction and evaluation. An outline processor is "a word processing program which is specialized for processing outlines, in that its main commands deal with movement among, creation of, and modification of outline entries" (Conklin 1987:25). Most outline processors also have some text formatting, so the user can use the same tool to go from outline to finished document. Engelbart created the NLS/Augment which allows "the user a view of just the top level of the outline, or the top n levels, or she can walk the trees, opening up just those entries that are relevant or useful to the idea that she is working on. In addition, each outline entry can have a textual body of any length associated with it, and the user can make this body appear or disappear with a single keystroke" (Conklin 1987:25). Outline processors also enable the user to suppress lower levels of detail in the outline.

Most outline processors are personal computer programs and include: Think Tank, MaxThink, Executive Writer/Executive Filer, Thor, Framework, Kamas, Fact Cruncher, Freestyle, Idea!, and PC-Outline to name a few (Hershey 1985:337).

Outline processors allow colleagues the option to restructure outlines, and to evaluate outline entries by calling associated text. With suppression, users learn the important rules of relative strength in hierarchies, and visualize the relationships between non-hierarchical

reasoning within greater hierarchies of meaning.

Finally, hypertext, and especially hypermedia, revolutionizes personalized speech instruction. Hypermedia has been the focus of much hypertext research during the eighties. "Instead of linking just text, hypermedia could like to other media, such as graphics, video, spreadsheets, animations and voice. In short, users of hypermedia systems can link together information of any media provided by current technology" (Smith 1988:33). Conklin even suggested that elements which are networked together could include "tastes, odors, and tactile sensations" (1987:18) once full digitalized videodisc technology comes of age.

The implications for instructors of public speaking are endless: preview of audio-visual aids, criticism of speaking rehearsal, etc., against the outline and formal text of the speech itself.

The overarching vision which Nelson and others propose is called "hyperworld -- a vast realm of published text and graphics, all available instantly; a grand library that anybody can store anything in with links, alternate versions, and backtrack available as options to anyone wishing to publish them. It is a world:

> * whose windowed documents are link freely to one another;
> * where every quotation may be traced instantly, and seen in its original context;
> * where minority interpretations and commentary may be found everywhere;
> * where any point disagreed with may at once be restated "in the margin," with only minor changes, by any commentator; thus good explanations of everything soon become available;
> * where a collage of parts can be assembled by anyone into a new unifying vision, but the doubtful reader may wander off into a constituent part and not return;
> * where an article published on Wednesday is festooned with disagreements by Friday, widely windowed the following week, forgotten the next year, rediscovered in a decade (Nelson 1982:174).

Futurists see a world with an explosion of information which will be beyond current analytical means. They call for a means to access and apprehend ideas and information which will reduce the labor involved by

several orders of magnitude. For some, hypertext is an answer.

Perhaps as important as reducing the labor of making a book by several orders of magnitude -- and the Gutenberg revolution helped replaced feudal monarchies with industrial republics based on a literate citizenry, anyone who thinks society is dangerously slow in responding to opportunities and dangers should consider how hypertext could help. In a time of technological turbulence, a working hypertext system could make the the difference (MIT/Nanotechnology Study Group 1987:n.p.)

REFERENCES

Bush, Vannevar. "As We May Think." ATLANTIC MONTHLY. July 1945. 101-108.

Conklin, Jeff. "Hypertext: An Introduction and Survey." COMPUTER. September 1987. 17-41.

Drake, Mirian A. "Lbirary 2000 -- Georgia Tech: A Glimpse of Information Delivery Now and in the Year 2000." ONLINE. November 1987. 45-48.

Drexler, K. Eric. Engines of Creation. New York:Anchor Press. 1986.

Engelbart, D. C. "A Conceptual Framework for the Augmentation of Man's Intellect." in Vistas in information Handling. Vol. 1. London:Spartan Books. 1963.

Halasz, F. G. et al. "NoteCards in a Nutshell." PROCEEDINGS OF THE ACM CONFERENCE ON HUMAN FACTORS IN COMPUTING SYSTEMS. Toronto, Canada. April 1987.

Hershey, W. "Idea Processors." BYTE. June 1985. 337.

"Fractal Shorthand." SCIENTIFIC AMERICAN. February 1988. 28.

Kinnell, Susan K. "Information Retrieval in the Humanities Using Hypertext." ONLINE. March 1988. 34-40.

Lancaster, Frederick W. Toward Paperless Information Sysytems. New York:Academic Press. 1978.

McCorduck, Pamela. The Universal Machine. New York:McGraw Hill. 1985.

MIT/Nanotechnology Study Group. "Nanotechnology Press Kit." Cambridge, MA: MIT AI Laboratory. 9 July 1987.

Nelson, Theodor H. "The Tyranny of the File." DATAMATION. 15 December 1986. 83-86.

Nelson, Theodor H. Literary Machines. Chicago: Nelson. 1984.

Nelson, Theodor H. "A New Home for the Mind." DATAMATION. March 1982. 169-180.

Nelson, Theodor H. "Replacing the Printer Word: A Complete Literary System." IFIP PROCEEDINGS. Holland:North-Holland Publishing Co. October 1980.

Ofiesh, Gabriel D. "The Seamless Carpet of Knowledge and Learning." in Lambert, Steve and Suzanne Ropiequet, eds. CD/ROM: The New Papyrus. Redmond, WA:MicroSoft Press. 1986.

Rittel, H. and M. Webber. "Dilemmas in a General Theory of Planning." POLICY SCIENCES. VOL. 4. 1973.

Smith, Karen E. "Hypertext -- Linking to the Future." ONLINE. March

1988. 32-34.

Twigg, R. H. "A Network-based Approach to Text Handling for the Online Scientific Community." PhD. Thesis. University of Maryland. 1983.

Yankelovich, N., et al. "Reading and Writing the Electronic Book." COMPUTER. October 1985.